SIEMENS

Mobilett Plus/ E/ M/ HP

SP

Service

Installation Instructions

Installation of remote exposure switch system

Chapter	Page	Revision
All	All	02

Document revision level

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Purpose

This document describes how to install a remote exposure switch system on a Mobilett Plus/ Plus E/ Plus M/ Plus HP.

Important note

After the installation is done, separate the last chapter, "the Supplement to the Instructions for Use", from the document. It is important to insert this chapter into the Instructions for Use for the Mobilett product affected, unless the remote exposure switch system already is described in the Instructions for use. This shall be done to help the user how to use the remote switch system after the installation.

Parts required

Remote exposure switch system kit, including:

- Two remote controls (one spare)
- IR sensor with modular cable
- PCB electronics package with flat cable
- Ferrite core
- Washers
- Ground connector cable
- Tie-mounts
- Cable ties
- This instruction

Tools required

- Standard installation tools
- Masking tape
- Electric drill with 13 and 4,8 mm drill bits

Time required

- Approximately one hour for one person

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SPS-UD

Mobilett Plus/ E/ M/ HP
Service

Safety information

> ⚠ **CAUTION**
>
> **Be sure to unplug the unit from the mains or turn off the main circuit breaker before performing any service.**
>
> **Remove or install boards only when the generator is switched OFF. Adhere to the ESD guidelines.**
>
> **Checks and adjustments performed with radiation ON are identified by the radiation warning symbol ☢. During these types of adjustments, radiation protective clothing must be worn.**
>
> **Observe all MOBILETT safety guidelines.**

Assembly

Fig. 1   Removal of Mobilett covers
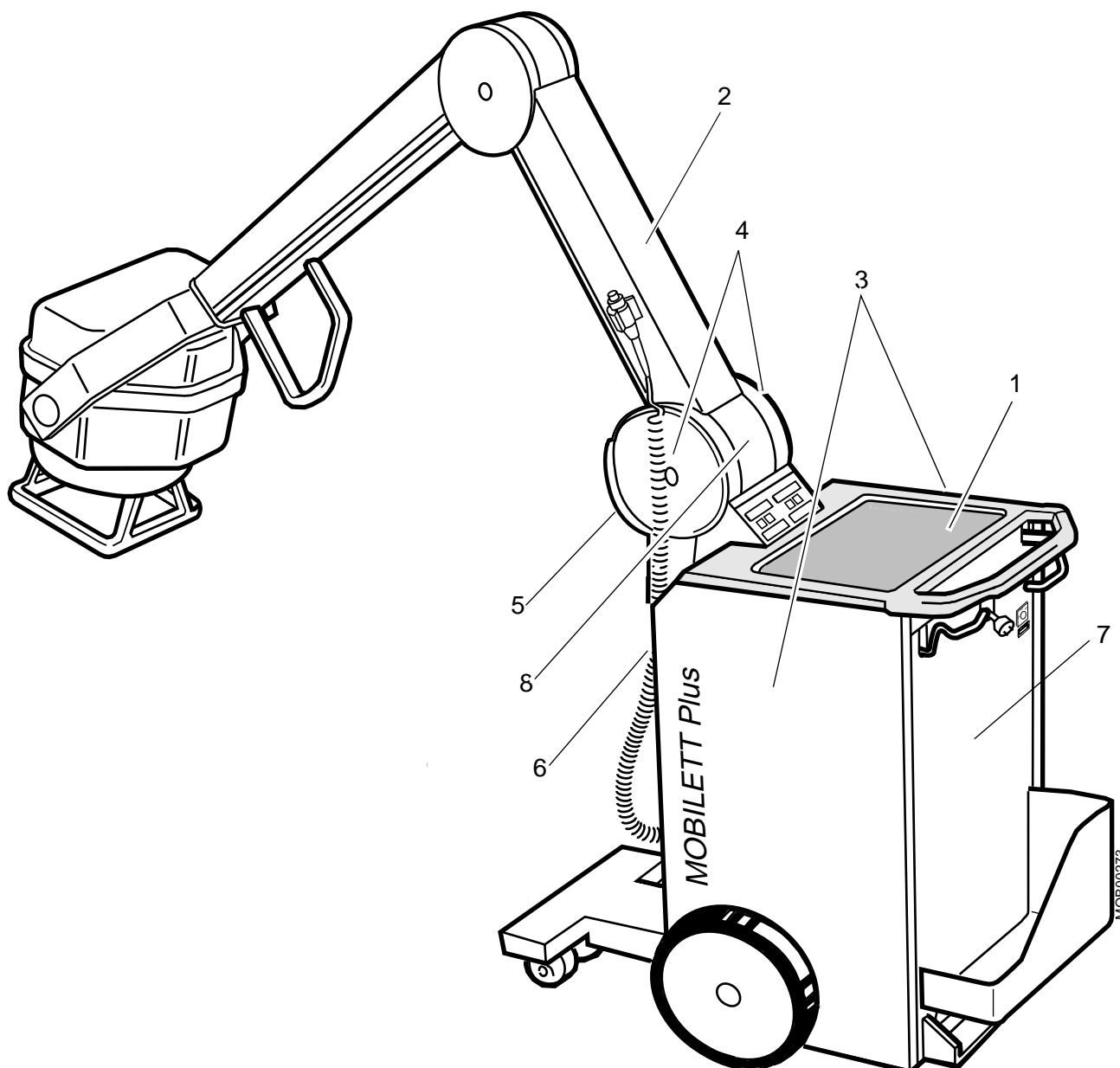
1. Remove the Mobilett top cover plate (pos 1 / Fig. 1), and the protection plate of the CPU board below, to expose the main CPU D1, see Fig. 6.

2. Remove the cover of the Mobilett articulated arm (pos 2 / Fig. 1), the right and left side covers (pos 3 / Fig. 1), both the right and left circular covers (pos 4 / Fig. 1), the rear cover of the articulated shaft (pos 5 / Fig. 1) and the front cover with cassette holder (pos 7 / Fig. 1).

3. Switch S10 to discharge position. After approximately 5 minutes the capacitors will be discharged. Measure the discharge procedure between measuring points CAPPOS and CAPNEG on the D7 board (pos 6 / Fig. 1) with a digital multimeter.

NOTICE	**For MOBILETT Plus HP only:**
	Remove the cover in front of the batteries. Disconnect one of the blue battery connector pairs.

If the Mobilett is equipped with covers of the articulating arm without holes (pos 2 / Fig. 1) follow the procedure described in step 4 to 6.
Otherwise remove the plastic plugs and continue with step 7.

4. Place masking tape on the disassembled cover (pos 2 / Fig. 1) over the positions for the three holes, see Fig. 2, in order to protect the painting of the covers.

5. Drill the three holes on the cover with the dimensions and positioning according to Fig. 2.

6. Smoothen the sharp edges of the newly drilled holes with a file.
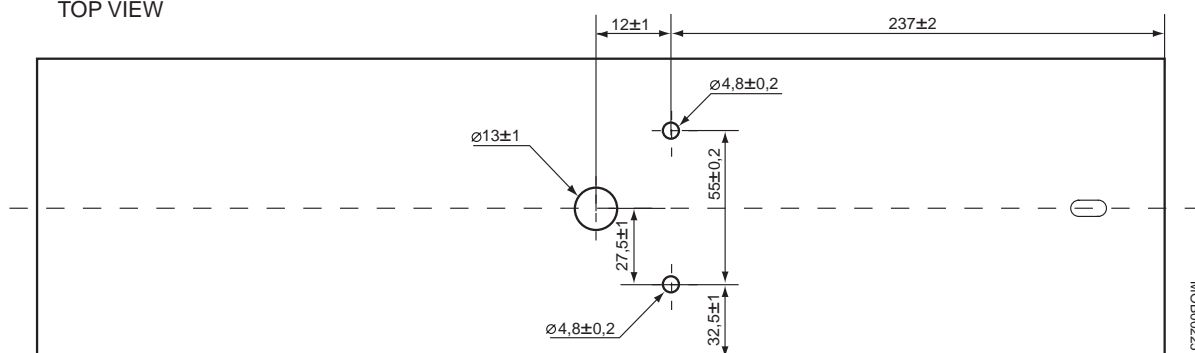
SIDE VIEW

TOP VIEW

Fig. 2   Positioning of holes

7. Refer to Fig. 3 and Fig. 4 and mount the remote sensor to the Mobilett arm cover with the hardware supplied. Make sure that the cable is secured above the IR-sensor to avoid the sharp edges of the thin metal cover below (pos 8 / Fig. 1).
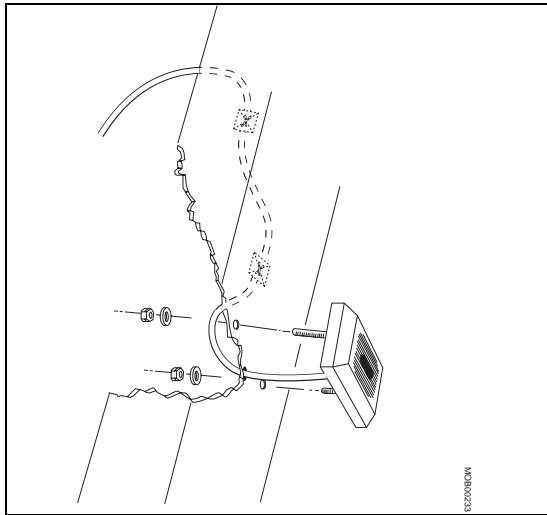
Fig. 3   Mounting of remote sensor
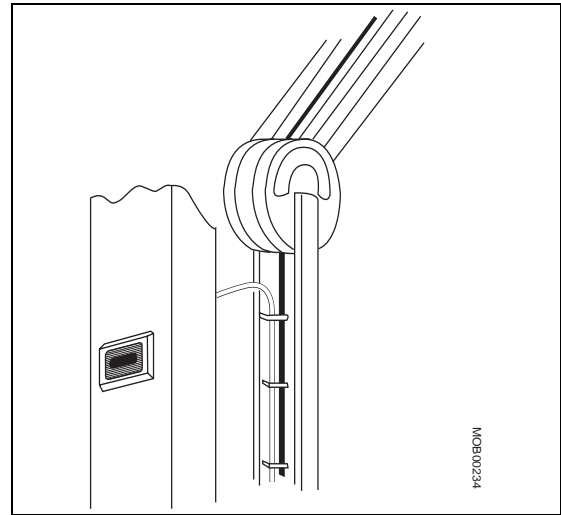
Fig. 4   Leaving a vertical loop of the cable

8. Leave a vertical loop in the remote sensor cable and use cable ties to wrap the cable to the existing cable harness in the Mobilett articulated arm making certain the cable will not become cut or crimped, see Fig. 4 and Fig. 5. Assure that the cable will not be in contact with the axis of the articulated arm (pos 1 / Fig. 5).

Module connector   Remote sensor   1

Fig. 5

9. Feed the free end of the cable with the module connector from around the back and into the right side of the machine.

Fig. 6

MOB00665
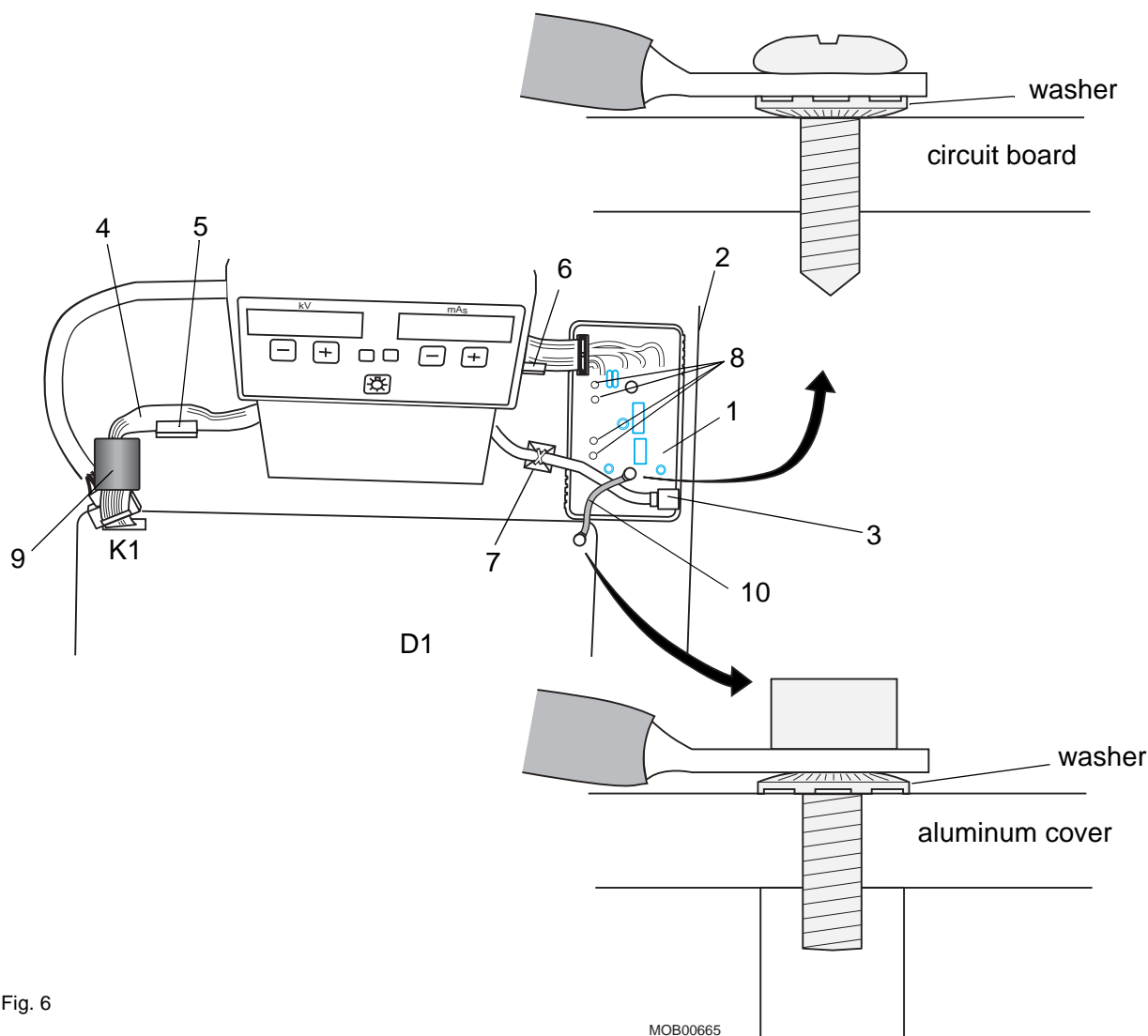
10. Mount the electronics package (pos 1 / Fig. 6) alongside the main Mobilett CPU board with the double-sided tape. Make sure that the distance between the right side metal wall (pos 2 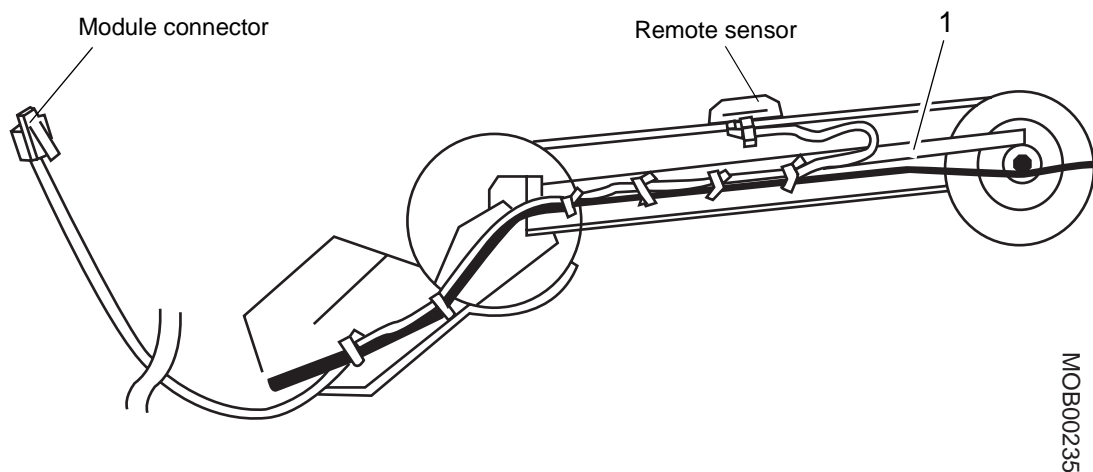/ Fig. 6) and the electronics package is at least 15mm. Plug the module connector from the remote sensor into the package (pos 3 / Fig. 6)

11. Unplug the existing connector from D1K1.

12. Using the IDC connector supplied, route the PCB flat cable behind the control panel and connect it to D1K1 (pos 4 / Fig. 6).

13. Fold the flat cable and fasten the ferrite core around it (pos 9 / Fig. 6) as close to the K1 connector as possible.

14. Reconnect the unplugged connector to the extra IDC connector.

15. Fasten the ground connector cable (pos 10 / Fig. 6). Make sure the washers are oriented as described in Fig. 6.

16. Position the provided tie-mounts to the areas indicated in Fig. 6 at pos 5, 6 and 7.

Functional check

The system should now be tested prior to securing the covers. All testing is done by observing the LEDs (pos 8 / Fig. 6) on the PCB electronics package. The PCB electronics package has an infrared detector. Make sure that S10 is in charge position.

NOTICE	When testing this system please be certain to observe all necessary guidelines for radiation safety and protection. When setting the exposure parameters use the lowest possible values for kV and mAs.

NOTICE	For MOBILETT Plus HP only: Reconnect the loose battery connector pair.

1. 'ON' LED (Green, LED4)

   Description: Illuminates when the X-ray unit is turned on.
   Test: Turn the X-ray unit on as if to make an exposure.

   Error: LED does not illuminate.
   Fault elimination: Check that the X-ray unit works properly with the original handswitch. Check the TechSwitch PCB wiring to the machine.

2. 'REC' LED (Red, LED3)

   Description: Illuminates when the infrared beam is being detected.
   Test: Point the remote control towards the infrared detector on the TechSwitch PCB and press the collimator light button.

   Error: LED does not illuminate.
   Fault elimination: Check that 'ON' LED is illuminated. Test with another TechSwitch remote control. Possible dead battery or faulty remote control. Replace remote control battery (9-volt alkaline only) and repeat test.

   Error: Light does not come on with any TechSwitch remote control.
   Fault elimination: Check the wiring to the remote sensor prior to replacing the TechSwitch.

3. 'ROT' LED (Red, LED2)

   Description: Illuminates when the prep command is activated.
   Test: Point transmitter of the remote control toward the remote sensor, and momentarily press and release the exposure release switch.

   Error: LED does not illuminate.
   Fault elimination: Check that 'ON'LED is illuminated and that 'REC'LED lights with remote control activated. Otherwise replace the TechSwitch PCB.
   Error: 'ROT'LED lights with no beam directed toward it.
   Fault elimination: Replace the TechSwitch.

4. 'EXP' LED (Red, LED1)

| ⚠CAUTION | **Make certain there are no other mobile units with a TechSwitch remote system in line-of sight. This includes any units behind a window or lead glass. If there are other mobiles in line-of-sight, power down those mobiles while operating the other.** |

Description: Illuminates when the exposure command is activated. Must be lit for the full period of sustained remote control activation.

Test: Point the remote control towards the remote sensor. Press and hold down the exposure release switch until exposure light is lit.

Error: 'EXP'LED does not illuminate, stays illuminated, or. illuminates for no apparent reason.

Fault elimination: Check that all other LEDs are illuminating. Otherwise replace the TechSwitch.

| NOTICE | **The exposure control function of this system is a "dead-man" type switch. If the exposure command is interrupted during an exposure, the exposure is automatically discontinued.** |

| NOTICE | **All four LEDs on the TechSwitch PCB must be lit for an exposure to occur.** |

5. Remote finder test (transmitter):

Description: Repeats a series of beeps if left out of the holder.

Test: Remove the remote control from its holder on the X-ray machine and set it to the side for three (3) minutes.

Fault elimination: Check that the transmitter continuously sounds three (3) consecutive beeps every five (5) seconds.

Test: Push the collimator light button on the remote control and the beeping will discontinue. Wait another three (3) minutes and notice the beeping resumes. Press no buttons and place the remote control back in its holder. The series of beeps should end.

Fault elimination: If no beep, replace the remote control.

6. Make a series of exposures to be certain the remote system is functioning properly. Set the kV to 90 and 125 (133 if possible) and maximum mAs for the exposures.

Final procedures

NOTICE	When testing this system please be certain to observe all necessary guidelines for radiation safety and protection.

NOTICE	**For MOBILETT Plus HP only:**
	Disconnect one of the blue battery connector pairs.

1. Switch S10 to discharge position. After approximately 5 minutes the capacitors will be discharged. Measure the discharge procedure between measuring points CAPPOS and CAPNEG on the D7 board (pos 6 / Fig. 1) with a digital multimeter.

2. Reassemble all the covers except the top cover plate and the front cover with cassette holder.

3. Switch S10 to charge position.

NOTICE	**For MOBILETT Plus HP only:**
	Make sure that battery connector pair is reconnected and the battery cover is reassembled.

4. Reassemble the front cover with cassette holder and the top cover plate.

5. Tape the remote holder to the Mobilett as suggested in Fig. 7. Place the remote (with the remote finder feature and low battery indicator) in the holder, and store the second spare (included in the delivery) in a safe place in the Radiology Department.

Mobilett Plus/ Plus E/ Plus M   Mobilett Plus HP
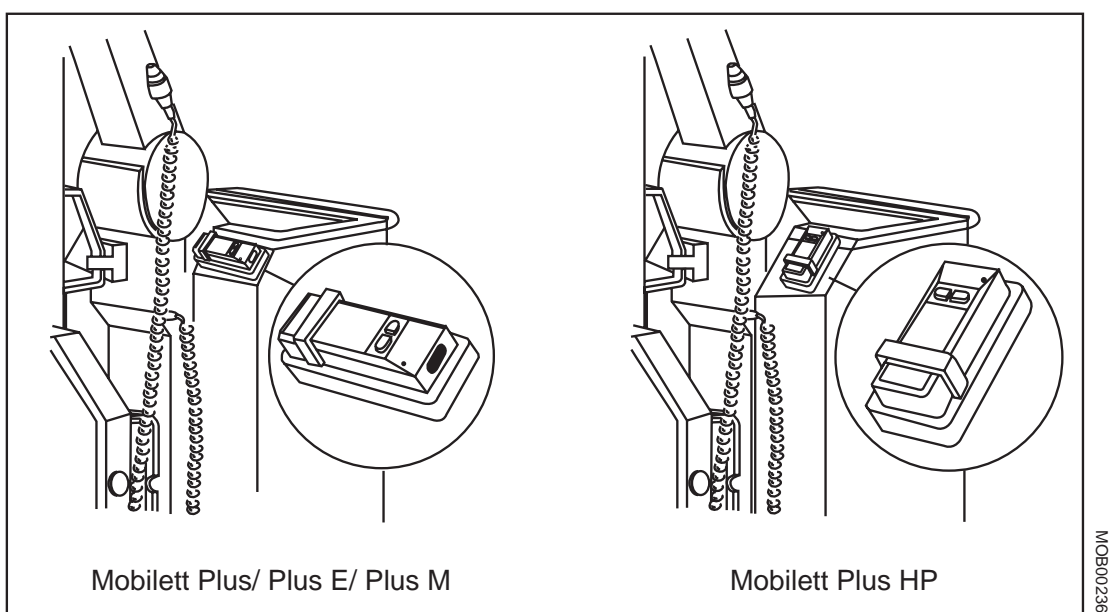
Fig. 7   Placing of remote holder on Mobilett

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Changes to previous version 3 - 1

New components added for installation; ferrite core and ground connector cable.

Image on page 2-4 updated.

Safety notes revised.

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Design and function

Overview

Parts and controls

Arm system

Tube assembly

Remote sensor (Option)

Control and display panel

Transport handle

Hand/parking brake handle

Power cord

Mains switch

Collimator

Exposure release switch

Cassette compartment

Carriage unit

Tilt bar

Support wheels

Vertical column

Vertical column

Remote control (Option)

Remote control (Option)

Remote holder (Option)

Remote holder (Option)

Transport safeguard

Transport safeguard

MOB00237

Mobilett Plus/ Plus E/ Plus M

Mobilett Plus HP

Remote control (Option)

Infrared window

Low battery indicator

*Collimator light
button ON/OFF*

Exposure release switch

Battery compartment

Protective Measures

Radiation protection

Both for the patient and the operation personnel:

- Make certain there are no other mobile units with a TechSwitch remote
  system (option) in line-of sight. This includes any units behind a window or lead glass. If
  there are other mobiles in line-of-sight, power down those mobiles while operating the
  other.

Operation

Remote control (Option)

⚠CAUTION	Make certain there are no other mobile units with a TechSwitch remote system in line-of sight. This includes any units behind a window or lead glass. If there are other mobiles in line-of-sight, power down those mobiles while operating the other.

Take the remote control out of its remote holder. Step back from the X-ray unit (up to 36+ feet / 10,9 m), and aim the remote control at the remote sensor on the front arm of the X-ray machine.

The remote control is used in two-step. When pressing the exposure release switch once, the preparation cycle is activated. The green "Ready" lamp goes out and does not light up again until anode rotation has reached full speed (after approx. 2.5 s). This is indicated by three short "beeps". The generator is now ready for exposure release.

NOTICE	It is possible to wait a maximum of 15 s in the preparation position before releasing the exposure, otherwise the preparation will automatically be switched off.

To release the exposure, press the exposure release switch a second time, and hold it down until the exposure is terminated. The amber exposure indicator lights during the exposure. The indication lasts somewhat longer than the actual exposure, in order to make the operator aware of very short exposures. A longer beep indicates the end of the exposure.
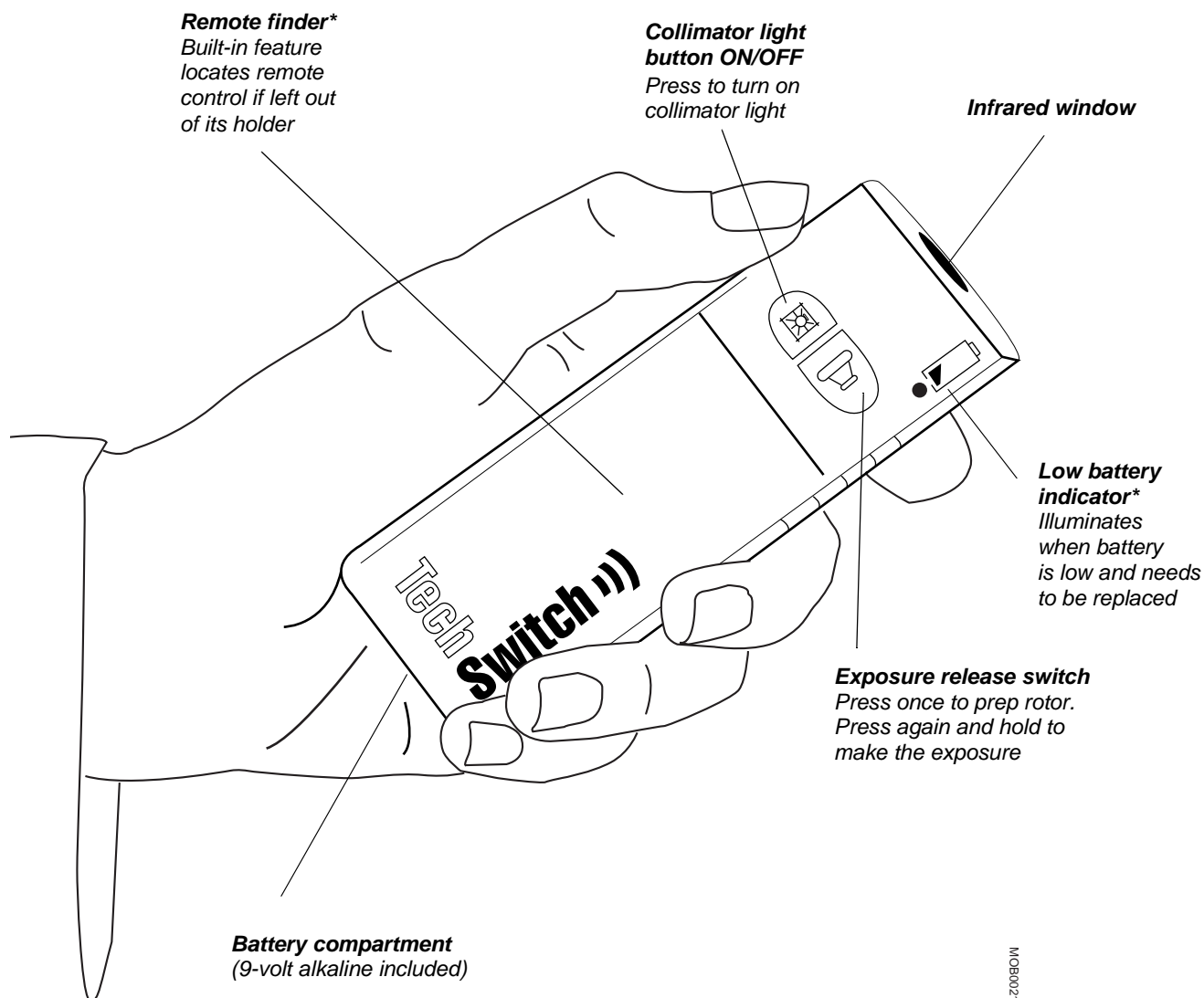
After the exposure is completed, both the X-ray unit and remote control will automatically return to stand-by mode.

Return the remote control back to its remote holder on the X-ray unit.

NOTICE	If the remote control is not returned to its holder within three minutes after use, the Remote finder feature will activate causing the remote control to beep. The beeps will continue indefinitely until the remote control is located and put back in the remote holder.

Remote control (Option) features

Remote finder*
*Built-in feature
locates remote
control if left out
of its holder*

**Collimator light
button ON/OFF**
*Press to turn on
collimator light*

Infrared window

**Low battery
indicator***
*Illuminates
when battery
is low and needs
to be replaced*

Exposure release switch
*Press once to prep rotor.
Press again and hold to
make the exposure*

Battery compartment
(9-volt alkaline included)

MOB00211

* These features are not implemented in the spare remote control (included in the kit)

Technical Specifications

Remote control, TechSwitch (Option)

Compatibility:	Compatible with all TechSwitch remote exposure switch systems
Technology:	Infrared light beam, line-of-sight operation, will operate through glass and lead glass; will not operate through doors or walls
Power Source, Remote control:	9-volt alkaline battery included; 25.000+ exposures; Low Battery Indicator illuminates when battery needs to be replaced
Signature Recognition, Remote Sensor:	Proprietary coding. No other known infrared remote system will activate
Operating Distance:	Up to 36+ feet (10.9 m)
Operating Radius:	180°; Remote Sensor built into the front arm of X-ray unit
Remote control kit includes:	Two remote controls (one spare), IR sensor with modular cable, PCB electronics package with flat cable

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